

(Abstract) GOES-R Aviation Weather Applications

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Aviation is weather sensitive and in flight operations can be adversely affected by thunderstorms, turbulence, aircraft icing, volcanic ash, head/tail winds, and fog or ceiling restrictions. New technologies are becoming available that will improve aviation safety. These include weather in the cockpit displays, new remote sensing instruments such as the GOES-R, and improved numerical forecast modeling capabilities. Weather in the cockpit displays are now becoming available for both domestic US data services and international services that will provide cockpit displays of weather anywhere in the world. In the GOES-R era, thunderstorm detection will be enhanced by use of algorithms such as the Global Convective Diagnostic (GCD), by higher spatial resolution of the IR channels, and by the Lightning Mapper instrument being considered for flight on the GOES-R bus. Turbulence detection will be enhanced with the higher resolution water vapor channels on GOES-R, as well as the sounder potentially being able to detect the vertical eddies causing the turbulence. Aircraft icing caused by flying through super cooled water droplets potentially will be detectable using the new channels on GOES-R to differentiate between ice and water droplets at cloud top. Volcanic ash detection will be enhanced by the return of the 12 micron channel (sensitive to silicates in the ash) to the GOES, and the addition of the 8.6 micron channel that can detect SO₂ as well as differentiate ash from clouds using particle size. The addition of additional water vapor channels on GOES will allow for feature tracked winds at multiple levels in clear air. Low cloud and fog detection at night will be enhanced with the higher resolution channels. The potential addition of a blue channel on the GOES-R will allow for the detection of haze during the day. The measurement of cloud heights will be improved with the GOES-R sensors. Finally the numerical models are beginning to assimilate remotely sensed data from GOES and other satellites allowing for improved forecasting of convection and other weather hazards. In summary, satellite information is becoming important for safe, efficient aviation operations. The weather forecasts are improving, and technologies are now becoming available for the direct delivery of weather information to pilots in flight.

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